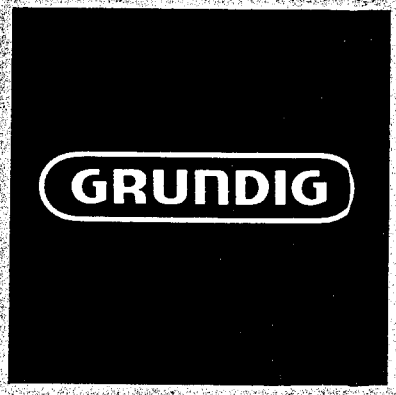
Bedienungsanleitung
Operating Instructions
Mode d'emploi
Istruzioni per l'uso
Gebruiksaanwijzing



TS 1000

HIFI-STEREO

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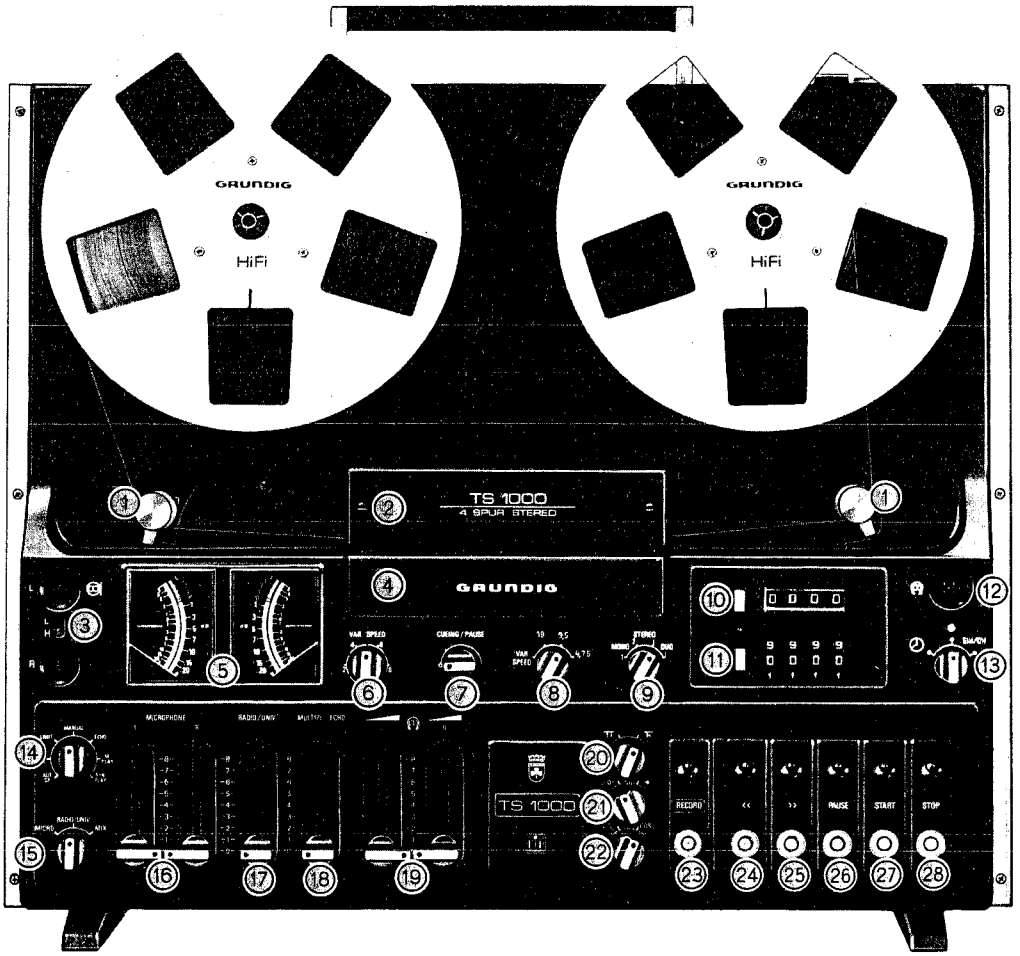
GRUNDIG
HiFi
GRUNDIG
HiFi
TS 1000
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GRUNDIG
TS 1000
RECORD
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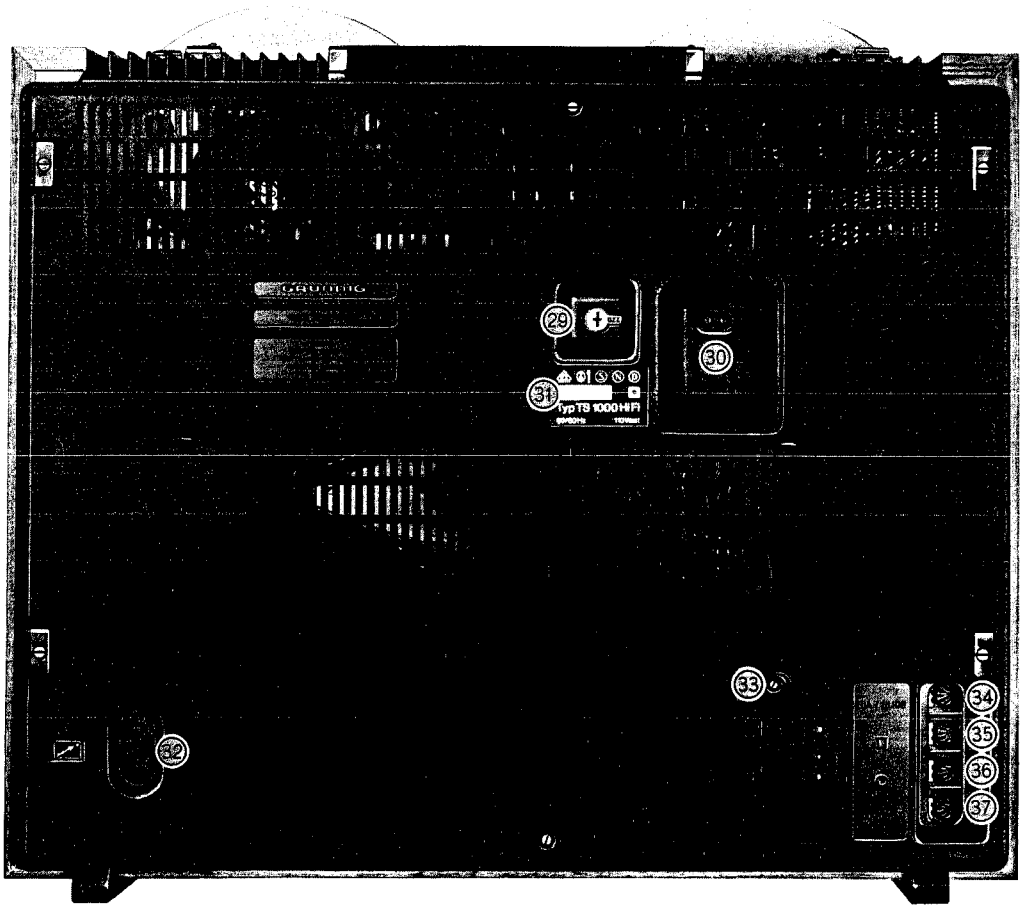
typ TS 1000 HiFi
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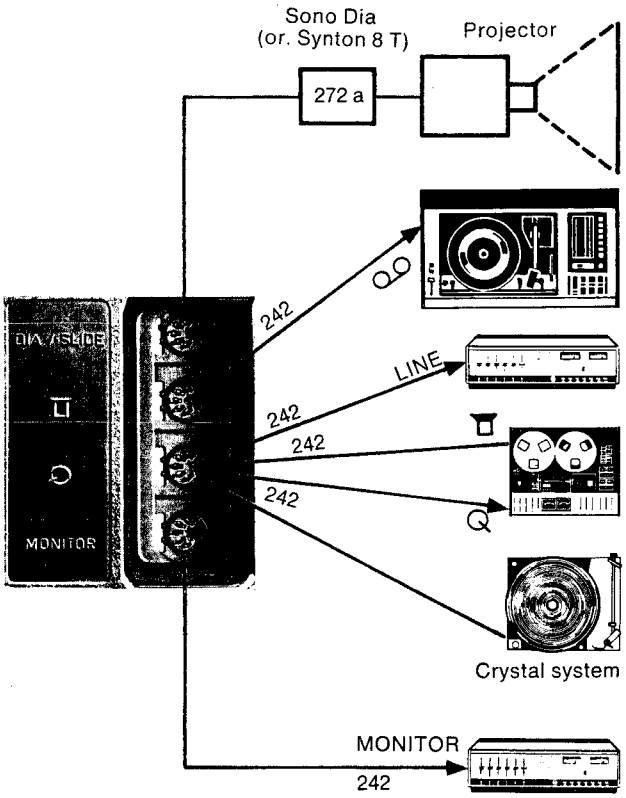
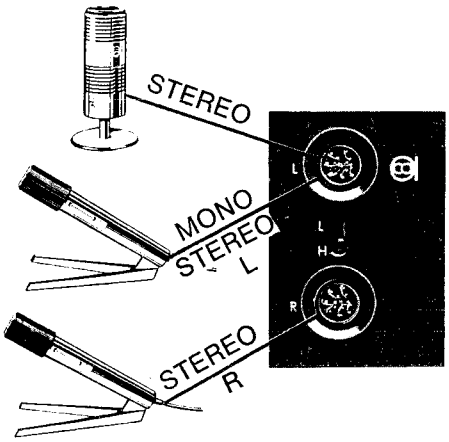
① **Tape tension arms** (left hand and right hand).
② **Tape heads** and mounting block (replaceable).
③ **Microphone socket L** – stereo microphone or mono microphone left.
Microphone socket R – mono microphone right. For unbalanced microphones. A switch is provided for use with balanced studio microphones.
④ **A tape splicing block** is mounted under the cover bearing the GRUNDIG motif. The diagonal splicing guide slit is positioned next to the playback head gap.
⑤ **Level meters:** To check the signal level when recording or playing back. The meters are illuminated when the instrument is switched on.
⑥ **Variable speed control:** To adjust the forward and rewind speed between approx 3 metres per sec – 8 metres per sec and/or the tape running speed approx 3 cms per sec – 22 cms per sec with the tape speed selector ⑧ switched to VAR SPEED.
⑦ **CUEING switch:** By turning the switch to the right it is possible to listen to a previous recording during rewind (to locate a precise section of the tape). The switch can also be used as a manual tape stop control (for short pauses).
⑧ **Tape speed selector:** Three fixed speeds are available 4.75 cms sec, 9.5 cms per sec and 19 cms per sec. The fourth position – VAR SPEED – is for variable speed control ($\leq$ 4.75 cms per sec to $\geq$ 19 cms per sec).
⑨ **Track selector:** Positions MONO 1 and MONO 2 are for selecting tracks when recording and playing back in mono. Position STEREO for stereo operation, DUO for simultaneous playback of both mono tracks.
⑩ **Tape position indicator with reset button:** For easy location of individual recordings.
⑪ **Memory counter:** To programme the memory for the auto stop, set the numbered control discs to the required position and press the adjacent button. (The red light emitting diode will come on).
⑫ **Stereo headphone** socket for Hi-Fi headphone fitted with a DIN 45 327 plug.
⑬ **Mains switch:** For switching the instrument on and off. For operation with the optional external time switch, press the locking button and switch on (to the left). At the selected time the instrument will automatically switch to START/RECORD.
⑭ **Record mode selector:** For making recordings when the level is to be automatically adjusted switch to position AUTO SP – for recording speach or position AUT MUS – for recording music. In the MANUAL position the level should be adjusted using the control sliders in conjunction with the level meters. If the switch is moved to the LIMIT position any peaks of information which would normally be over recorded will be controlled by an automatic circuit. Position ECHO, M. PLAY and SYN. PLAY are for special effect recordings.
⑮ **Input selector:** Position MICRO for microphone inputs, RADIO/UNIV for radio and/or universal inputs, MIX for mixing signals fed into the microphone sockets and the radio/universal input sockets.
⑯ **Level controls for manual microphone recordings:** For mono, only one slider level control needs be operated. For stereo it is possible to balance both left and right inputs by operating both slider level controls.
⑰ **Level control** for manual recordings via the radio or universal input sockets.
⑱ **Level control** for multiplay and echo recordings (special effects).
⑲ **Volume control** for headphone amplifier.
⑳ **A/B monitor switch:** Position ⊼ for monitoring the signal to be recorded. Position ⊼⊼ for monitoring the recorded signal via the tape (Mono or Stereo).
㉑ **NR switch:** For switching in the Dolby noise reduction circuit (optional extra).
㉒ **LIN/CONT switch (loudness control):** Position LIN = linear response, position CONT = loudness contour (most noticable at low volume level settings).
㉓ **RECORD touch sensor:** The record sensor ㉓ must be touched at the same time as the pause sensor ㉖ or the start sensor ㉗. The instrument will stay in the record mode until an automatic or manual stop command is given.
㉔ **Rewind touch sensor (⟨⟨)**
㉕ **Forward wind touch sensor (⟩⟩)**
㉖ **Pause touch sensor:** For temporarily stopping the tape motion while recording or playing back.
㉗ **Start touch sensor:** To start the tape in motion when recording or playing back.
㉘ **Stop touch sensor:** For cancelling all previous commands.
NOTE
The touch sensors ㉓ to ㉘ have red light emitting diodes mounted directly above them to indicate the function being used.
Controls and sockets mounted at the rear of the instrument
㉙ **Mains voltage selector:** The instrument can be set to the correct mains voltage by turning the voltage selector with a screwdriver. The correct working voltage will be displayed in the adjacent window. 110 V, 130 V, 220 V or 240 V.
㉚ **Mains socket.**
㉛ **Model type and rating plate.**
㉜ **Input sockets for remote control.**
㉝ **Preset output level control:** To adjust the level of the output signal.
㉞ **DIA/SLIDE socket:** For connection to a 8 mm film projector or slide projector via a GRUNDIG 272 A Sono Dia.
㉟ **Radio socket:** For recording or playing back from a radio or tuner/amplifier.
㊱ **Universal socket:** For connection to a ceramic or crystal cartridge or a second tape or cassette recorder. (Line input.)
㊲ **Monitor socket:** For connection to a Hi-Fi amplifier fitted with a switch for A/B monitoring. The GRUNDIG cable 242 should be used for the connection. (Line output.)

General

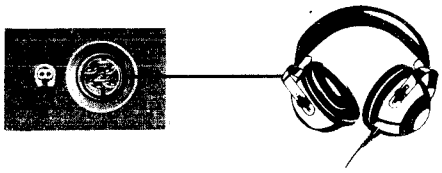
The instrument can be operated in a horizontal or vertical position. Unless otherwise stated an indication such as "top" or "bottom" will refer to the recorder being used in a vertical position.
When using the instrument on a polished surface of a piece of furniture we suggest you place the instrument on a felt mat or cloth. The lacquers and varnishes used in the finishing materials on some polished surfaces may react with the plastic feet fitted to the TS 1000 causing permanent damage to the polished surface.
The machine can be operated with the lid closed when using tape spools of less than 22 cms in diameter. For 27 cms tape spools the lid must be removed or left open. When the machine is being operated horizontally the ventilation holes at the rear must not be obstructed. If the machine is operated in confined spaces i.e. inside furniture, extra care should be taken to ensure sufficient ventilation. If the machine is to be used permantly in the horizontal position bothe the plastic legs can be removed. After removing the legs, do not forget to re-fit the fixing screws.
The machine is supplied with head carrier type 436 which is fitted with four track stereo heads. Two other head carriers are available as accessoires, type 435 fitted with two track stereo heads and type 437 fitted with four track stereo heads but suitable for reverse operation. For Dolby operation a plug-in unit type 438 is available which should be fitted by your local dealer. The switch ㉑ mounted on the front panel is used for switching the Dolby unit in and out of operation.
For remote control operation an accessory type 439 must be used which duplicates the functions of touch sensor controls ㉓ to ㉘.
The model type and ratings plate ㉛ is located on the bottom of the machine.

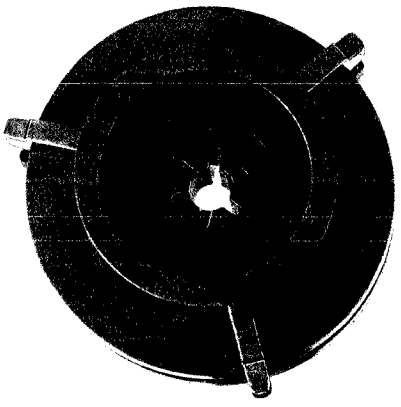


Connecting sockets at the rear



Microphone connecting sockets





NAB adapter

Main Connection

When your TS 1000 leaves the factory, it is adjusted to 240 V AC 50 Hz. The mains voltage selector ㉙ and the mains input ㉚ are mounted on the rear of the machine. If it is necessary to run your machine on other mains voltages the setting can be changed by turning the voltage selector with a screwdriver. The mains voltage selected can be seen in the window adjacent to the voltage selector. The TS 1000 can be operated on a 50 Hz or 60 Hz mains supply (example USA) without any mechanical conversion. Before connecting to the electricity supply check that the mains selector window is showing the same voltage as the local mains supply. Disconnect from the mains supply before making any adjustment.

NOTE for sets used in Great Britain.
We reccomend a 13 amp 3 pin plug be used fitted with a 3 amp fuse. The brown lead must be fitted to the live pin (marked L or red or brown) and the blue lead to the neutral pin (marked N or blue or black). On no account should either of the wires be connected to the earth pin (Marked E or green or green-yellow).

Other Connections at the Rear (Accessories)

DIA/SLIDE socket ㉞:
For connection of an adapter for automatic slide or 8 mm film projectors. Example. GRUNDIG Sono Dia 272A for slide projectors or Sinton 8 T or 16 T for 8 mm film projectors. The Sinton adapters are manufactured by Helmut Volland Elektronik, D-8520 Erlangen, Äussere Brucker Strasse 160. West Germany.
Radio socket ㉟:
The radio socket ㉟ should be used to connect the TS 1000 to the TA/TB (tape socket) of your radio or tuner/amplifier via a GRUNDIG 242 connecting lead. Stereo recordings of radio or phono signals can be made or replayed via the socket.
Universal socket ㊱:
For connection to the line output socket of a Hi-Fi amplifier (for making recordings with improved signal-to-noise-ratio). The socket can also be used for direct connection to a ceramic or crystal cartridge or for connection to another tape or cassette recorder when copying tapes.
MONITOR socket ㊲:
For connection to a Hi-Fi amplifier having switching facilities for A/B monitoring. The signal available at socket ㊲ is affected by the A/B switch ⑳ on the front of the TS 1000. A GRUNDIG connecting cable 242 can be used.
The level of the signal available at socket ㊲ can be adjusted by turning the preset control ㉝ with the aid of a screwdriver.

Connections on the Front of the Machine

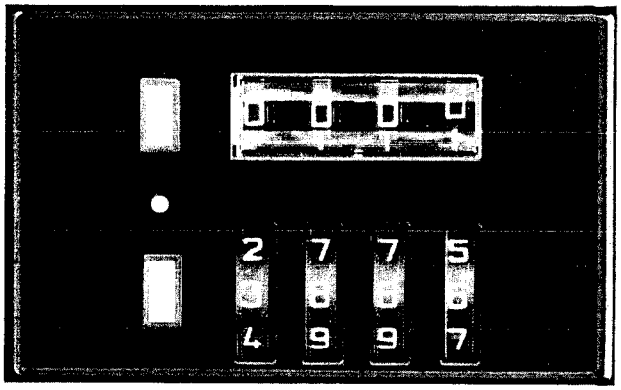
Microphone socket ③:
The socket can be used for all GRUNDIG microphones both capacitor and dynamic, stereo or mono. The switch fitted between the two microphone sockets should be operated with the aid of a small screwdriver. The switch modifies the input circuitry to enable the machine to be used with low impedance balanced line studio microphones. L = Low impedance, H = High impedance.
Socket ㉛ or **L** can be used for connecting a GRUNDIG stereo microphone example GCMS 332 or a mono microphone for mono recordings. A stereo recording may be made by using two mono microphones one plugged into th **L** socket and the other plugged into the **R** socket.
Headphone socket ⑫:
For connection to Hi-Fi stereo headphones fitted with a DIN 45 327 plug example GRUNDIG GDH 219 or GDH 221. The headphones can be used for monitoring when making a recording or for listening on playback.

Fitting the Tape

Conventional tapes up to 27 cms in diameter, with spools having standard centre holes can be used on the TS 1000. Adapters are available for tapes with NAB centres.
Before fitting the spools to the spool holders make sure that the retaining clips are correctly aligned. Place the full spool on the left and the empty spool on the right. Pull and twist the top of the retaining clips to lock the tape spools in position. The reels will not ride off when the machine is used in a vertical position.
Take a length of leader tape from the full spool and holding it straight pass it round the left hand tension arm ① through the sound channel and round the right hand tension arm ① to the empty spool.
Pull the leader tape throught the sound channel and attach the free end to the right hand spool. Turn the spool by hand until the leader and the metal stop foil have been fully wound onto the spool.

Tape Position Indicator

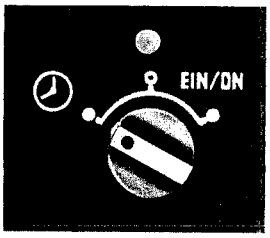
After fitting a tape to the machine, depress the small button adjacent to the position indicator ⑩ to set the indicator to 0000. The numbers appearing on the tape position indicator can be noted and used to build up an index of recorded information. This will enable you to locate recordings easily in the future – remember to set the indicator to 0000 at the beginning of the tape.
Location can be simplified by using the memory counter ⑪. Programme the memory by setting the control discs to the required numbers and press the adjacent button – the red light emitting diode will be illuminated. With the button depressed the tape will always stop when the two sets of numerals coincide.



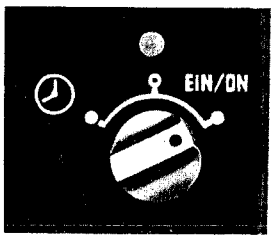
Tape position indicator and memory counter

Switching On and Off

After connecting the unit to the mains turn the mains switch ⑬ to the right to the on position. The level meters ⑤ will light up showing the TS 1000 is ready for operation.
When using the optional time switch the button above the mains switch ⑬ must be depressed and the switch turned to the left. At the preset time the TS 1000 will be automatically switched on in the START/RECORD mode.



Setting for time switch operation



On position

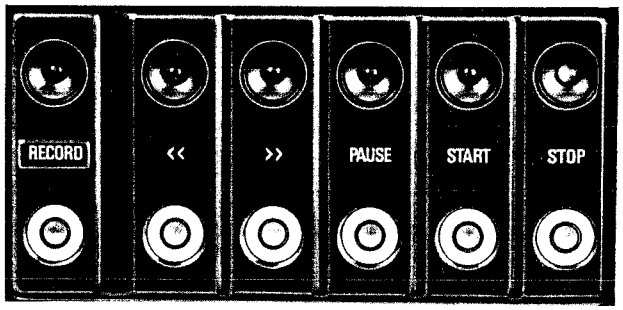
Mains switch

Tape Speed

The tape speed is selected by the four position switch ⑧.
4.76 cms per sec should be used for speech or light entertainment, for example pop music. The conservative use of tape makes this speed specially suitable for background music.
9.53 cms is suitable for high quality music reproduction.
19.06 cms per sec will ensure the best possible reproduction of very high quality music with extended dynamic range, for example piano and violin concerts etc. This high speed enables exceptional high frequency response and the best signal-to-noise ratio.
The fourth switch position VAR SPEED can be used for making trick recordings or for accuratly pitching musical notes. The speed is infinitely variable between approx 3 cms per sec and 22 cms per sec – adjusted by speed control ⑥.

Preparing to Record

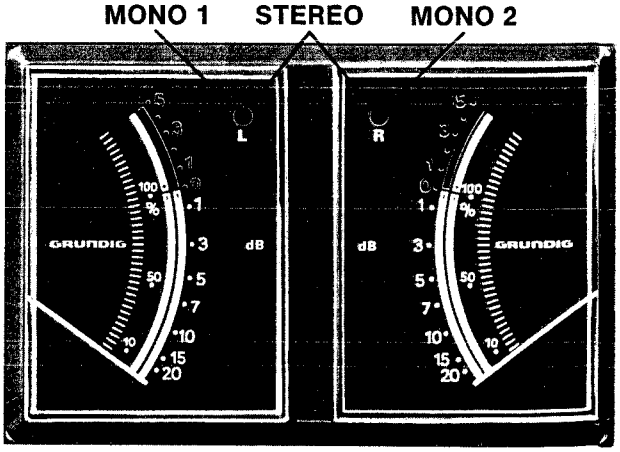
Check that all the necessary connections have been made, the required tape speed has been set and the tape properly threaded. The following examples will help you to understand the direct record procedure.
Example 1. Recording a radio programme.
When recording a mono radio programme, track selector ⑨ should be switched to MONO 1 position. For stereo programmes track selector ⑨ should be switched to STEREO.
To make your first recording we suggest you use the built in automatic level control facility. Turn the recording selector switch ⑭ to the required position AUT SP for automatic speach or AUT MUS for automatic music.
By touching the RECORD/PAUSE sensor plates simultaneously – both light emitting diodes will light up – the machine will be held in the record/pause mode. The light emitting diodes fitted inside the record level meters ⑤ will show onto which track the information is to be recorded.
ie. Left hand meter diode illuminated: MONO 1 (left channel).
Right hand meter diode illuminated: MONO 2 (right channel).
Both meter diodes illuminated: Stereo recording. If neither diode lights up despite the machine being set to the record mode, the track selector ⑨ is probably set to DUO.
The level meters ⑤ can be used to check that the automatic level control circuit is functioning correctly. The meter needles should first touch the red portion of the meter scale and then settle to a point just below the red portion – even on the loudest passages. When you decide to start the recording the START ⑰ sensor must be touched.
Example 2. Recording from a gramaphone record or copying a pre-recorded tape.
Proceed as for example 1 until the point of setting the automatic record level circuit.
When recording from a gramaphone record or copying a pre-recorded tape try to find the loudest passage. Return to the beginning of the record or rewind the tape you wish to copy and start your recording.



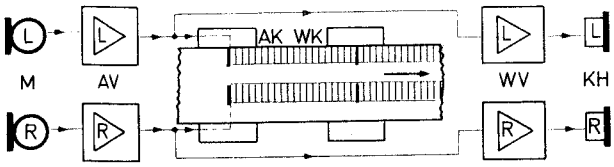
Touch sensors with light emitting diodes

Hints for Making Microphone Recordings

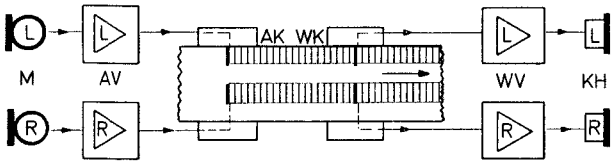
Remember to switch the input selector ⑮ to the MICRO position. Acoustic feedback may occur if the headphones used for monitoring the recording are used in the vicinity of the microphone. We would suggest that the volume of the headphone monitor amplifier be reduced by adjusting level control sliders ⑲.



Level Meters



Monitoring (Stereo)



Via tape monitoring (Stereo)

M = Microphone
AV = Recording amplifier
AK = Recording head
WK = Playback head
WV = Playback amplifier
KH = earphone
L = lefthand channel
R = right-hand channel
IK = Impulse head
IS = Impulse track

A/B monitoring

Monitoring "A"

Position ⇆ is for monitoring via headphones the recording at the precise moment it is being made.
Monitoring is particularly recommended when making live recordings -setting the relative levels between voices and instruments. It enables you to obtain a precise balance between the vocalists and the musicians. The monitoring volume is adjusted by means of the volume slider control ⑲ or by the volume control fitted to an external amplifier used for monitoring purposes. The microphone should always be placed as far away as possible from the headphones or from the loudspeakers fitted to an external moniter amplifier.
If the LIN/CONT SWITCH is switched to the CONT (contour) position the frequency response of the monitor amplifier is dependant on the setting of the volume level controls ⑲. This facility is to compensate for the changing frequency response of the human ear as the sound intensity is reduced.

Monitoring "B"

In position ⇈ the monitoring signal is obtained via the replay head and a time delay will be introduced:

For 19 cms per sec	150 milli secs.
For 9.5 cms per sec	300 milli secs.
For 4.75 cms per sec	600 milli secs.

When making microphone recordings it is again advisable not to place the microphone in the same room as the monitoring headphones. This will avoid confusing echos and acoustic feedback which may occur.

Pause

When recording or playing back brief pauses are possible by touching the PAUSE sensor ㉖. To restart the tape touch the START senser ㉗. If the machine was set to the record mode the setting will not be lost.
Pauses can also be made by operating the CUEING/PAUSE SWITCH ⑦. Pauses made in this way will be completely silent. The tape will stay stationary as long as the switch is turned to the right.

Stop

By touching the STOP sensor ㉘, every previous command will be cancelled.

Forward Wind/Rewind

To listen into your recording the tape must first be rewound by touching the rewind sensor ㉔. If however you wish to select a passage further on you must touch the forward wind sensor ㉕. The forward/rewind speed can be adjusted by control ⑥ to a maximum of approximately 8 m per second. To stop the tape at the required point touch the STOP sensor ㉘.
Any of the sensors ㉔, ㉕, ㉗ can be touched without touching the stop sensor ㉘. The tape tension arms will absorb all the stresses incurred without stretching or breaking the recording tape – even if very thin tapes are used.

Automatic Switch Off

The stop foils fitted to the end of GRUNDIG recording tapes will automatically activate the stop circuit as they pass through the sound channel. To re-start the tape touch the appropriate sensor.
After having rewound the recording tape at high speed the stop foils will over-shoot the sound channel. When the tape is re-started it will again stop as the foils pass through the sound channel.
If recording tapes without stop foils are used or if the tape should break, the machine will stop automatically.

Playback

During playback the selector switch ⑨ must be set to the same position it was set to when the recording was made – except for synchronous playback.
The replay volume is adjusted by the control fitted to the amplifier to be used in conjunction with the TS 1000 – the output at the radio socket being preset by the back panel control ㉝.
On playback of tapes with high sensitivity the pointers of the meters may move into the red field. This does not affect the playback quality.

Note

As mentioned earlier in the text the tape recorder is supplied fitted with a 4-track head carrier (type 436).
If a 2-track head carrier (type 435) or a 4-track head carrier (type 437) (auto reverse) is fitted, the operating instructions are the same unless otherwise stated.

Type and Number of Heads Fitted to the Head Carrier

Head carrier type 436: One 4-track erase head, one 4-track record head, one 4-track playback head and one sono-dia head.
Head carrier type 435: One 2-track erase head, one 2-track record head, one 2-track playback head and one sono-dia head.
Head carrier type 437 (4-track stereo auto reverse): One 4-track erase head, one 4-track record head, one 4-track playback head, and one 4-track playback head (reverse).
A switch for reverse operation, a slider for changing the direction. The kit includes a plug-in module which is fitted inside the machine. It can remain in position when the machine is operating with other head carriers.
Instructions for replacing the head carriers are given further on in the text.
The following information applies to all three types of head carrier.

Track Position of the Head Carrier

When a 4-track head carrier is used the 4-tracks are positioned adjacent to one another, previously described as quarter track. Fig. 1 illustrates the track numbering now used and the previous track numbering.
For mono recordings the tracks are recorded in succession 1 and 4 (mono 1) and 3 and 2 (mono 2) – see Fig. 2.
For stereo recordings tracks 1 + 3 and 4 + 2 – see Fig. 3.
For slides and 8 mm films – to be described later – the outer track is used (track 4 – after turning the tape over track 1) – see Fig. 4.
If the machine is used in the stereo mode in conjunction with a film projector the tape can only be used in one direction. If the machine is used in the mono mode the tape can be used in both directions, MONO 2 being used for the music – see Fig. 5.

Track Position of the 4-Track Stereo Automatic Reverse Head Carrier (drawings 2 and 3)

For recording proceed as for 4-track stereo.

NOTE

It is not possible to use a slide or 8 mm film projector when this type of head carrier is fitted.
The automatic reverse facility is only possible when the machine is switched to playback, the tape does not have to be turned over – a detailed description can be found on page 25.

Amplifier Construction

The TS 1000 is fitted with separate stereo record and replay amplifiers. Two separate tracks can be recorded and monitored simultaneously via the separate replay amplifiers. Apart from the normal mono or stereo recordings multi-play and echo recordings can be made.

S 1	=	1
S 2	=	4
S 3	=	3
S 4	=	2

Fig. 1: Track numbering

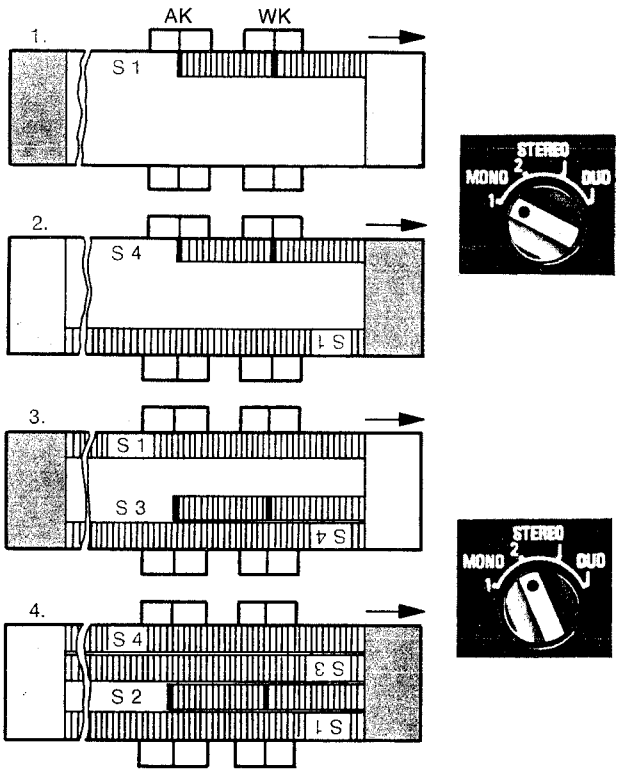


Fig. 2: Mono recording, 4 tracks

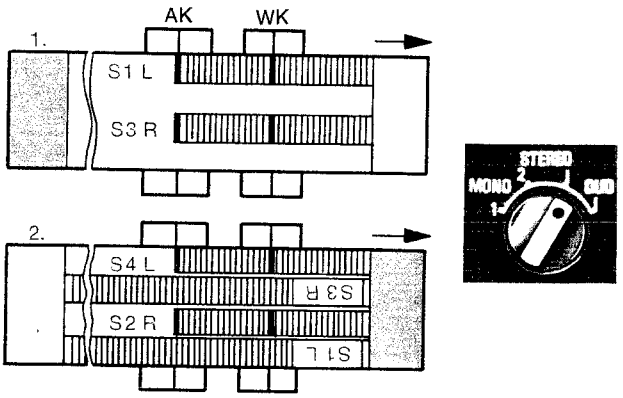
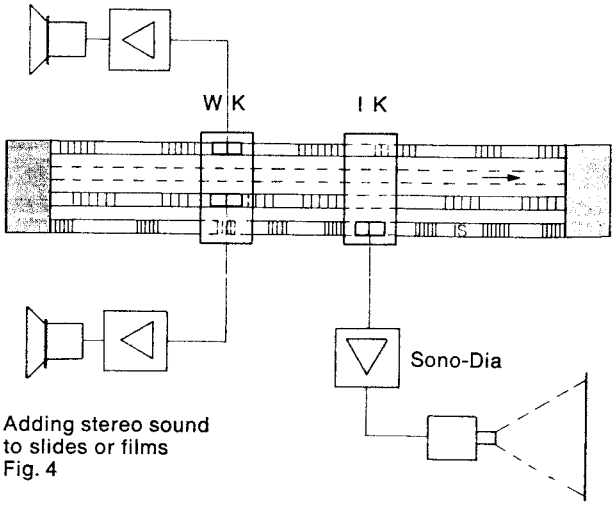


Fig. 3: Stereo recording



Adding stereo sound to slides or films
Fig. 4

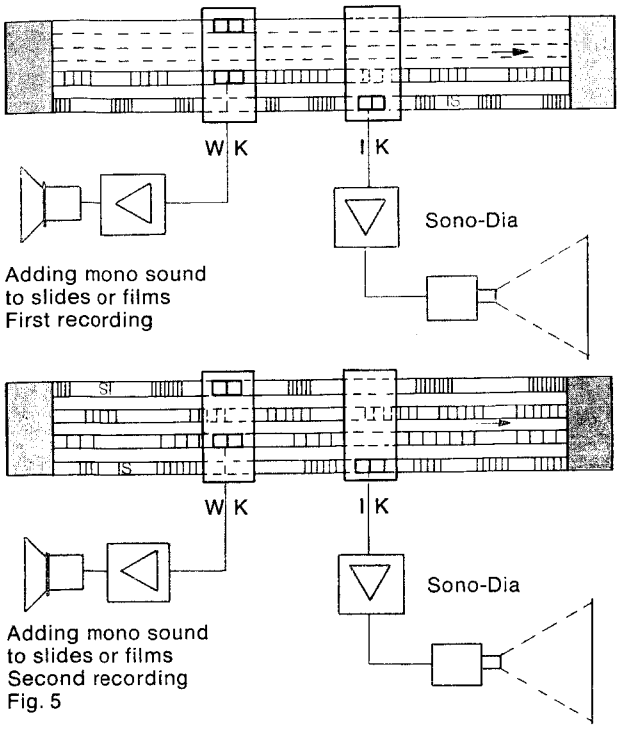


Fig. 5

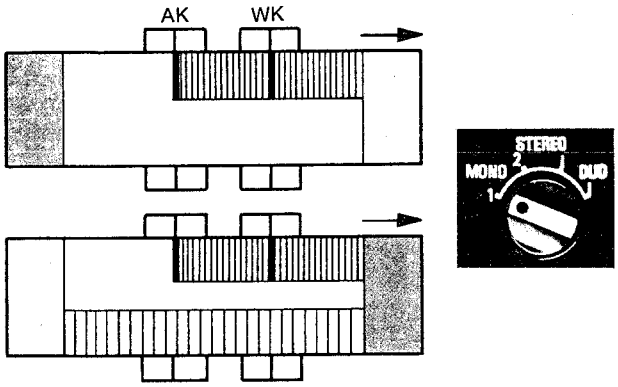


Fig. 6 Mono recording, 2-track

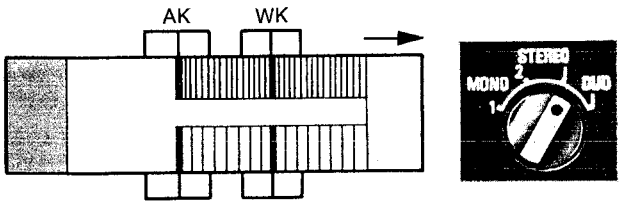
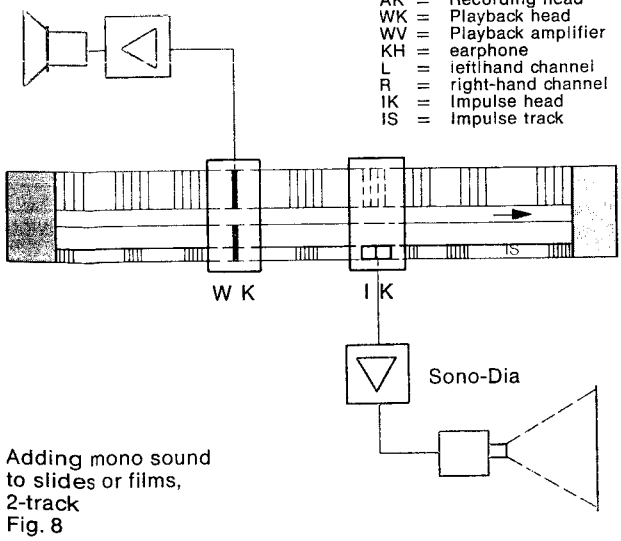


Fig. 7 Stereo recording, 2-track

M = Microphone
AV = Recording amplifier
AK = Recording head
WK = Playback head
WV = Playback amplifier
KH = earphone
L = lefthand channel
R = right-hand channel
IK = Impulse head
IS = Impulse track



Adding mono sound
to slides or films,
2-track
Fig. 8

Operational Examples and Track Identification

1. **Mono Operation**
   Turn the track selector switch ⑨ to MONO 1. The tape heads will record and play back on the top edge of the tape (or in the case of a 2-track head the upper half) – see Fig. 6.
   When making your first recording start with the green leader. When the recording has been completed and the tape completely used, turn the tape spools over. Place the full spool on the left and the empty spool on the right, and re-thread the tape. Make your second recording starting with the red leader. Leave the track selector switch ⑨ in the MONO 1 position. When the recording has been completed both outer tracks will have been used. (In the case of a 2-track machine both tracks will have been used and no further recordings can be made.) – See Fig. 6.
   For 4-track machines only, turn over the spools again, turn the track selector switch ⑨ to MONO 2 and make another recording starting with the green leader. When the tape has been used up, turn the spools over once again, leave the track selector switch ⑨ set to MONO 2 and make your last recording. Both centre tracks will now be fully recorded and the whole tape used up.
2. **Stereo Operation**
   To make a stereo recording turn the track selector switch ⑨ to STEREO. When the first recording is made starting with the green leader both tracks 1 and 3 will be used together (with a 2-track machine the tape will be fully used up and cannot be turned over) – see Fig. 7. Turn the spools over and proceed to make another recording starting at the red leader. Tracks 4 and 2 will now be recorded and the whole tape used up.
   The track selector switch ⑨ must be left in the STEREO position to replay stereo recordings.
3. **Duo Operation**
   By turning the track selector switch ⑨ to DUO, tracks 1 and 3 or 2 and 4 (in the case of a 2-track machine both tracks) are played back as a mono signal. The facility is useful for producing special effects – as described on page 24 – or for playing back stereo tapes in mono (for copying stereo tapes onto a mono machine).

Replaying Pre-recorded Tapes

As the 2-track and 4-track head carriers are inter-changeable no problems should be experienced when playing tapes recorded on another machine. If however, only one head carrier is available, e. g. 4-track, no problems will be experienced when replaying tapes recorded on a 2-track machine. If only a 2-track head is available 4-track tapes can be replayed, but only if the tape has only been used in one direction e. g. only 2-tracks used. When replaying 4-tracks tapes on a 2-track machine the signal to noise ratio will be impaired due to only half of the available track area having been recorded upon, the half with no modulation can contribute only tape noise.

Erasing Tapes

During the recording process any previous recording will automatically be erased.
If you wish to erase a previous recording without making a new recording, set the track selector switch ⑨ to MONO 1, MONO 2 or STEREO as required. Set the record selector ⑭ to MANUAL, set the input level controls ⑯ and ⑰ to minimum. Start the record process in the normal way by simultaneously touching sensors ㉓ and ㉗.

Remote Control

By plugging the GRUNDIG remote control unit type 439 into the rear socket ㉜ it is possible to remotely control the touch sensore functions ㉓ to ㉘.

Manual Recording

The machine is provided with separate level controls ⑯ for the microphone inputs left and right and level control ⑰ for the radio and universal inputs. When microphone recordings are being made the relative levels can be adjusted compensating for the microphones being placed in different positions.
A ganged level control has been incorporated for the radio and universal inputs to maintain correct balance at all times.
When stereo recordings are being made – track selector switch set to stereo – the light emitting diodes in both level meters will be illuminated. With the track selector switch set to mono 1 the left hand diode will be illuminated and with the selector switch set to mono 2 the right hand diode will be illuminated.
When adjusting the level controls ⑯ and ⑰ the level meters ⑤ should be observed. The controls should be set so that the meter needles just reach the OdB level on the loudest passages of music, or speech. Level control ⑯ L must be used in conjunction with level meter ⑤ left and level control ⑯ R must be used in conjunction with level meter ⑤ right. The level control ⑰ affects both level meters ⑤ simultaneously.
With the machine already in the record/pause mode simply touch the start sensor ㉗ to start the recording.

Adjustment of Record Level during Rewind

Manual adjustment of the signals to be recorded can be made during rewind. Simply touch the record sensor ㉓ and set the levels as previously described. The recording being rewound will not be affected.
After rewind touch the RECORD sensor ㉓ and the START sensor ㉗ simultaneously. The machine will immediately start to record.

Limiter

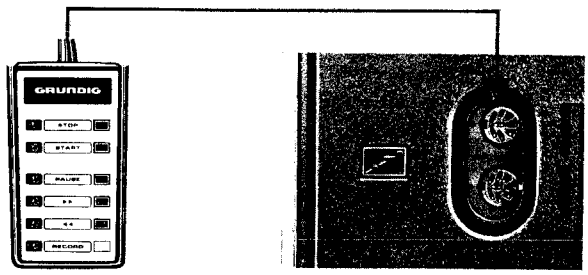
When making recordings with the record selector switch ⑭ in the manual position, it is possible that sudden increases in sound level – especially when making microphone recordings – could cause the tape to be over-recorded.
With the recording selector switch ⑭ set to the LIMIT position, sudden changes in signal level which would normally cause over-recording, when the record level has been set up manually, will be controlled automatically. When the machine is used in the LIMIT mode of operation the dynamic range of the recording will not be impaired.

NOTE
It is important that the recording level is adjusted manually before the recording selector switch ⑭ is switched to the LIMIT position.

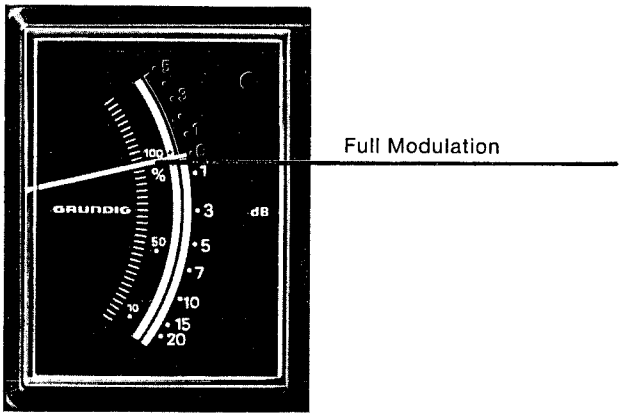
Mixing

The recording selector ⑭ must be set to MANUAL, and the input selector switch ⑮ set to MIX. When a gramophone record is being recorded or a tape copied, it is possible to add a voice or musical accompaniment.
We recommend you use a pair of headphones for monitoring. The relative levels of both signals can then be controlled during a trial recording.

Example:
Turn the track selector switch ⑨ to the required mode (eg: stereo) and the speed selector switch ⑧ to the required speed. Check that all the correct connections have been made and switch the machine to RECORD/PAUSE.
Adjust the level control ⑰ to the correct level and note the position. Return the control to zero and lift the tone arm from the gramophone record or rewind the tape being copied. Place the artist in front of the microphone and adjust the level controls ⑯ to the desired position. The apparent position of the artist can be varied from left to right by operating the slider controls ⑯ separately – with some practice one can simulate movement of the artist during a recording by careful adjustment of the level controls ⑯.
Return the level control ⑰ to the previously noted position and start your mixed recording by touching the start sensor ㉗.
A mono microphone should be connected via the adaptor plug 294 unless the connecting plug already has pins 1 and 4 shorted together.

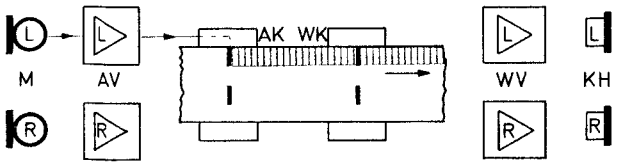


Remote Control Connection

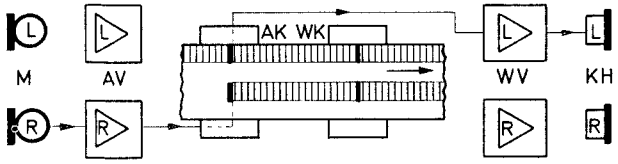


Record Level Indication

Speech can be recorded more intelligibly when the lower frequencies are removed. For this purpose we recommend you use the GRUNDIG adaptor 297 and if you intend speaking very close to the microphone we suggest you use the GRUNDIG windshield type 404.

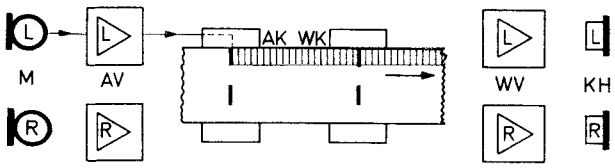


Synchro recording: 1. recording



Synchro recording: 2. recording

M = Microphone
AV = Recording amplifier
AK = Recording head
WK = Playback head
WV = Playback amplifier
KH = earphone
L = leftlhand channel
R = right-hand channel
IK = Impulse head
IS = Impulse track



Multi-tracking: 1. recording

Special Effects

Many of the problems encountered when adding music and commentary can be overcome with the TS 1000. With some practice the operator can become quite proficient. The machine can also be used for synchronising music and commentary to film slides or 8 mm movie films.
It can be of great advantage if the performer does not have to operate the tape recorder and is left free to concentrate on his performance. In the following examples we will differentiate between the artist and the operator.

Example 1: Synchro recording and Playback
Synchro recordings are those which are made on different tracks at different times with the intention of playing back both tracks together as a composite recording. E. g. adding a vocal accompaniment to a non-vocal gramophone record or tape. The voice is accommodated on a separate track on the tape and either the voice or the music can be corrected or changed as required.

NOTE
The example is not applicable to 2-track stereo machines when the second track is needed for control signals as explained by drawing 8, page 22.
On synchro playback the artist can listen to the main track via headphones connected to the headphone socket ⑫ whilst making his recording on another track.
The instrumental recording or reference recording is normally recorded on track 1 – track selector switch set to MONO 1 position. To make your synchro recording set the recording selector switch ⑭ to SYN PLAY and the track selector switch ⑨ to MONO 2. Set the machine to the record/pause mode. The level of the microphone recording to be made must now be adjusted. (In this example the level meter ⑤ right is used to set the level.) When the recording is started by touching the START sensor the voice will be recorded in synchronism with the main track – which is being played back by the recording head – on track 3 (for 4-track machines) or from track 2 (for 2-track machines). The synchro recording can be made time and time again until it is correct without affecting the main track. Whilst recording, both the main track and the track being recorded can be monitored via headphones and their levels controlled independently by the headphone volume controls ⑲.
Both tracks can be played back together by switching the track selector switch ⑨ to DUO.
The above mentioned monitoring can also be done via an external amplifier fitted with a monitor switch. It should be connected to the TS 1000 monitor socket via a GRUNDIG 242 connecting lead.
It is possible to use the other track as the main track. The synchro recording will be made the opposite way round i.e: level meter ⑤ left is used to control the recording level.

Example 2: Multi-tracking
The following example applies to 4-track and 2-track machines (for 2-track tracks 1+2). If the machine is to be used to control film slides or 8 mm movie films the main track should be recorded with the track selector switch ⑨ in the MONO 1 position. In the case of a 2-track machine only one track can be used for recording.
While synchro recording/playback produces and plays back two recordings, multiplayback adds the new recording to the recording on the main track. One track is always left blank and it is possible to repeatedly record new voices and add them to your previous recording. If you want to isolate one voice the last recording made in the synchro mode can be kept on the blank track.
Always select the last track used for recording when playing back a multi-playback recording. For a mixed recording (multi and synchro playback) DUO and STEREO playback is possible. When recording, the level will be indicated on the level meters ⑤ depending on the position of the track selector switch – MONO 1 = left, MONO 2 = right.
Let us assume that the first recording has been made. If you wish to add one or more voices proceed as follows:

Second Recording

Stereo headphones should be connected to the headphone socket ⑫ – the signals are also available from the headphone or loudspeaker sockets of an external monitor amplifier. A microphone should be connected to socket ③ L. The recording mode switch ⑭ should be set to M Play and the track selector switch ⑨ set to MONO 2. The level of the recording to be transferred can be adjusted by the multi-play control ⑱. The new microphone recording is adjusted by the level control ⑯ L or R, depending on the setting of the track selector switch (L for MONO 1 or R for MONO 2). First adjust the transfer level by means of the level control ⑱. The level control ⑯ must be set to zero and the machine set to Start/Record. During the recording the piano recording on track 1 is recorded on track 3 at the correct level. Stop the tape and rewind, set the machine to the pause/record mode and set the level control ⑯ to the correct level. Only the level control corresponding to the track selected is functioning. The position of the level control ⑱ must not be changed.

As soon as the tape is set in motion the mixing between the main track and the new recording takes place (piano and first voice).

If the performer is to hear only the main track, only the volume control for the main track should be operated (MONO 1 = R, MONO 2 = L). When operating the other volume control the mixed signals can be heard.

Third Recording

When the second recording has been made stop and rewind the tape. The track selector switch should be set to MONO 1 to record the next voice – none of the previous adjustments need be altered.

Set the machine to START/RECORD. The performer can listen to the original recording plus his own recording (piano and first voice). The second voice plus the previous recordings can also be monitored (piano and fist voice plus second voice).

For making further recordings with a third and fourth voice set the track selector switch to MONO 1 and MONO 2. For playback of multi-play recordings always leave the track selector switch in the same position as the last recording.

When making multi-track recordings we recommend you use the Dolby NR system to reduce the tape noise produced during the transfer of information from track to track.

Example 3: Recording with Echos

An echo can be added to a mono or stereo recording. The machine should be switched for A/B monitor operation and according to the speed selected a delayed signal will be obtained – 19,05 cm per second = 150 m sec, 9,53 cm per second = 300 m sec and 4,76 cm per second = 600 m sec. Turn the record mode selector ⑭ to ECHO and set the machine to START/RECORD. The level of the signal to be recorded is adjusted in the normal way by the level controls. The amplitude of the echo can be varied with the level control ⑱. The recording can be checked by using headphones.

Correcting a Previous Recording

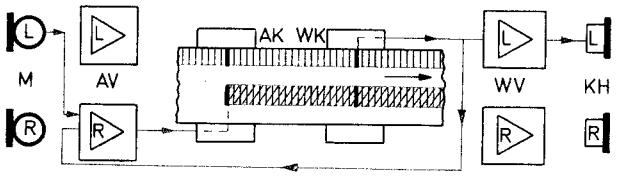
To correct a section of a previous recording run the machine in the replay mode and at the point that needs correcting touch the record and start sensors simultaneously, the machine will immediately switch to the record mode whilst the tape is in motion. The facility can be used for inserting texts into plays, or for special effects.

Automatic Reverse

For parties and special occasions it is possible to leave the tape running fowards and backwards continuously without interruption. The facility is only available when the machine is fitted with head carrier type 437 (optional extra, must be fitted by an expert technician). The carrier is fitted with a slide switch for changing the direction during playback, the direction is shown by two light emitting diodes.

For reverse operation use only tapes fitted with switching foils. After threading the tape pull it manually through the sound channel until the starting foil reaches the switch-off sensor. The reverse switch is set to ON and the track selected, the recorder starts.

The tape will run in the normal direction until the end of the tape is reached and the switching foil touches the sensor. The recorder stops automatically and after approximately 5 seconds the tape will start to run back in the opposite direction. The tape will continue to run from end to end until the stop sensor ㉘ is touched. When the direction of tape changes the tracks replayed will also change. E. g. track selector switch is set to stereo tape moving forward, tracks 1+3 replayed, tape motion reversed, tracks 4+2 replayed.



Multi-tracking: 2. recording

M = Microphone
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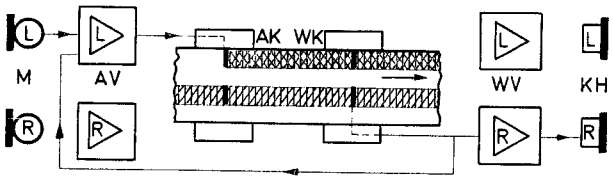
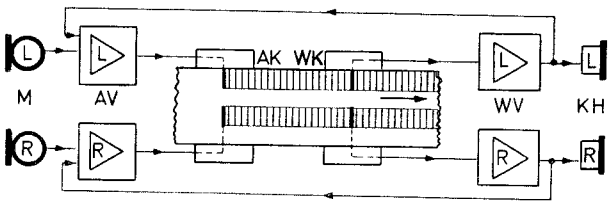
IS = Impulse track

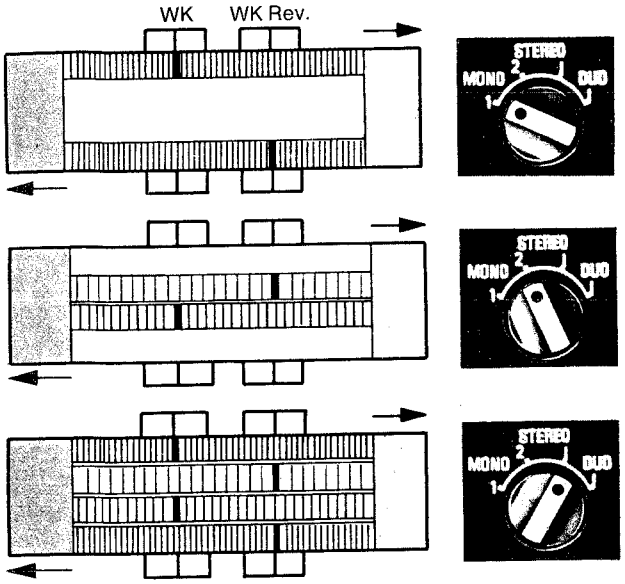


Multy-tracking: 3. recording



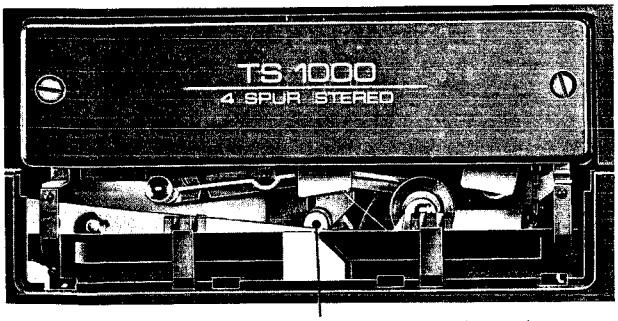
Echo recording (Stereo)

Head carrier 437

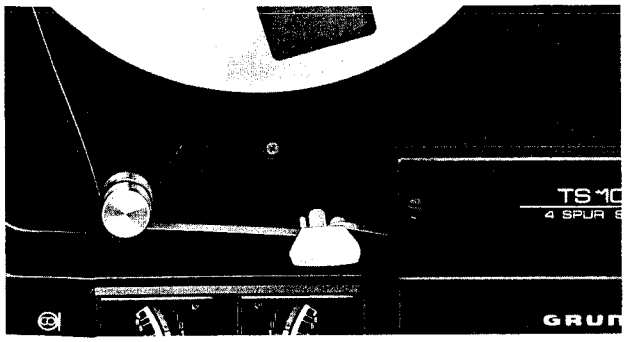


Automatic Reverse, Mono and Stereo
(WK Rev = Reverse Playback Head)

Removing the cover



Tape splicing channel



Tape cleaning

With the track selector switch in the MONO 1 position, track 1 will be replayed with the tape moving forward and track 4 will be replayed when the tape motion is reversed. With the track selector switch set to MONO 2 track 3 will be replayed with the tape moving forward and track 2 replayed when the tape motion is reversed.
If you wish to manually change the direction of the tape move the slider fitted to the head carrier. The tape will automatically change direction.
Ordinary 4-track recordings can be made when using the head carrier type 437 but the automatic reverse facility is only possible on replay – the circuit is blocked when the record sensor ㉘ is touched.
When the tape is rewound and the stop foil passes through the sound channel the automatic reverse circuit will switch over. To overcome the problem the reverse switch should be set to "OFF" for rewind.

Care of Recording Tapes and Splicing

Never place recording tapes on top of a central heating radiator or close to any other source of heat. Heat can seriously damage tapes and render them useless. Tapes should also be protected from strong magnetic fields and should never be placed near loudspeakers.
Please follow these recommendations as precious hifi recordings can easily lose their quality.
If you have to splice a tape – cut and join – you can use the built-in splicing block. There is a mark on the block showing the position of the playback head.
Slide the splicing block cover (bearing the GRUNDIG motif) towards the head mounting block ②, and lift off. Open the two tape fixing clips and place in both layers of tape to be joined. Close the clips and cut the tapes with a razor blade at the place indicated. Remove the upper free end of the tape and join the tapes remaining in the slot with an approved splicing tape (eg: as supplied by BASF). The splicing tape should not protrude over the edges of the recording tape.

Tape Cleaning

Recording tapes which have been subjected to extensive use should be cleaned before making a new recording – as shown in the illustration below. Locate the tape cleaning fork supplied with the machine in the respective fixing holes. Run the tape through the fork from left to right at medium speed without interruption. Dirty felt cleaning rings can be turned to a new position. Very dirty felt rings should be replaced.

Maintenance

The careful design of the TS 1000 tape recorder should ensure maintenance free operation for long periods. If, however, any distortion or other problems develop please consult your local dealer.
Dust and iron oxide particles deposited on the heads, the tape guides and the automatic switch-off contacts should be removed with a soft cloth moistened with alcohol or methylated spirits. Cleaning should take place after every 50 hours of operation – or sooner when using old tapes. Of course it is also possible to use the common cleaning kits (e. g. Videospray).
The tape tension rollers must be cleaned with a dry cloth without cleaning agents.
To gain access to the above parts and the capstan, remove the cover from the tape splicing block ④. Use a soft wooden stick (matchstick) to remove larger deposits. Never touch the surface of the heads with a metallic or hard object as they will almost certainly be damaged. The stationary parts can be cleaned easily and quickly with the GRUNDIG cleaning tape type 460. Fit the tape and run the machine in the playback position for approx. 3 minutes at speed 9,5 m per second.
The pressure roller and the capstan must be cleaned as described earlier.
Never bring magnetic tools close to the tape heads. Never attempt any other work.

Advice for Dealers

All the work mentioned in the following paragraphs should be carried out with the mains lead unplugged – except for re-adjustment of the playback head.

Mains Voltage Adjustment

The machine can be operated from a 50 Hz or 60 Hz mains supply without adjustment. Check that the voltage displayed by the voltage selector ㉙ is the same as the electricity supply at the customer's premises. The voltage can be switched between 110 V, 130 V, 220 V and 240 V (± 10 %) by means of a small screwdriver.

Changing the Head Carrier

The head carriers available for the TS 1000 can be changed without adjustment to the azimuth settings. To remove the carrier slide and remove the tape splicing block cover ④. Undo the two screws (a) and remove the head carrier vertically. The new head carrier is simply plugged in and the two screws (a) tightened evenly.
When fitting the reverse head carrier, loosen the 6 screws (b) securing the base of the machine and fit the reverse head carrier module to the free connecting socket on the motor control plate. The 3-pin link plug must be removed.
When using normal head carriers the reverse module can be left in position.

Head Adjustment for Playing Back Pre-recorded Tapes

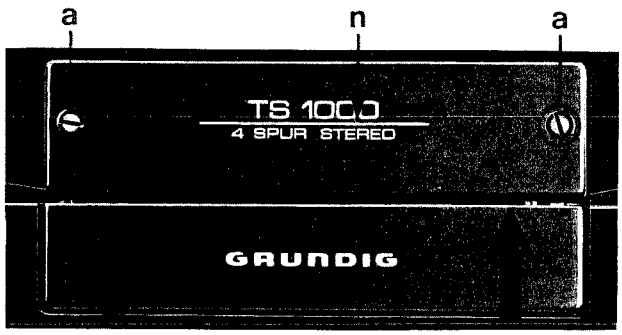
If a pre-recorded tape is played back and sounds muffled, it could indicate that the azimuth setting of the tape recorder which made the recording was out of adjustment.
To play back such recordings to their full advantage it is possible to adjust the azimuth of the TS 1000 playback head by turning the screw (n) – accessible through a small hole in the head carrier.
In order to re-adjust your playback head to replay your own tapes, record a sine wave between 8 and 10 kHz and switch to A/B monitoring. Adjust the position of the playback head to achieve maximum playback volume.

Fitting the Dolby NR Module

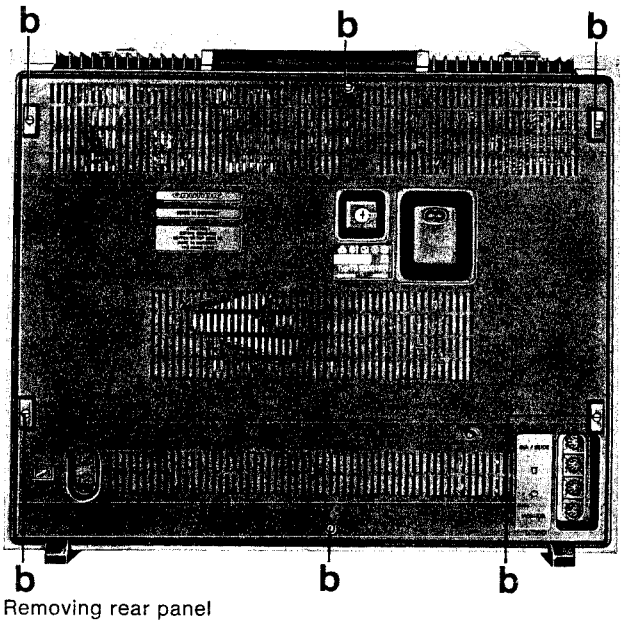
The signal to noise ratio of hifi recordings – especially transfer or multiplay recordings – can be improved by using the Dolby NR system. The Dolby NR switch ㉑ must be set to position NR for both recording and playback.
Both the Dolby NR modules (record – playback) are fitted by removing the bottom cover of the machine and fitting the modules in place of the link plugs. The modules are pre-aligned and no adjustment is necessary.
Only for the tape speed 4.76 cm/s it may be necessary to correct the frequency response by changing the bias voltage. Please stick the supplied self-adhesive label onto a good visible place.

The Dolby B-System

The Dolby system is an electronic circuit for reducing undesirable tape noise. With normal recordings tape noise can be annoying especially during quiet passages. Using the Dolby system, the high frequency content of low level passages is recorded at a much higher level than normal. On replay the low level passage which had been deliberately increased in amplitude is automatically reduced by the same amount. The result is that the quiet passages of music are now no longer spoiled by noise and the original quality of the recording is maintained.
The Dolby NR system is produced under Dolby licence. The word Dolby and the ⊡ symbol are trade marks of Dolby Laboratories Incorporated.

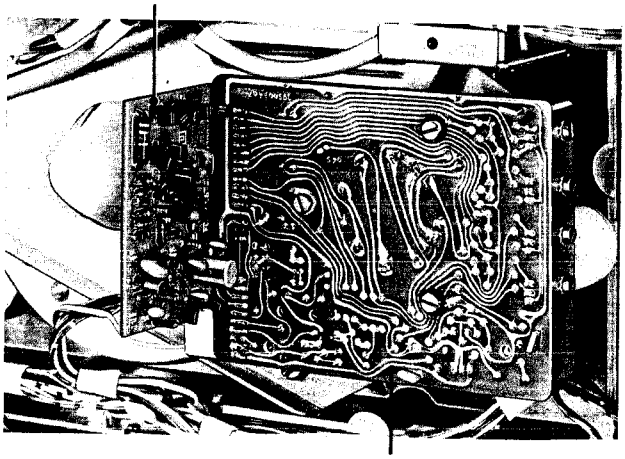


Changing the Head Carrier

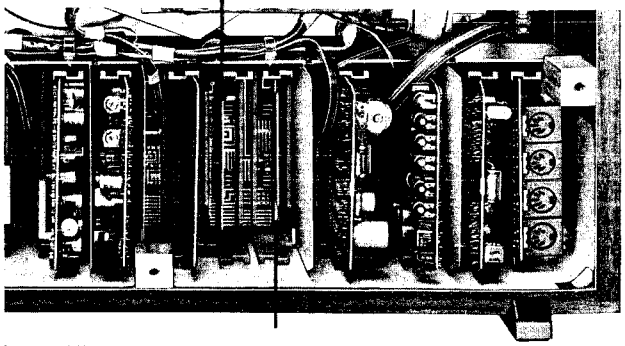


Removing rear panel

Automatic reverse module


Motor control
Fitting the automatic reverse module

Insert NR Dolby, recording module here


Insert NR Dolby playback module here

Specifications

General

A semi-professional hifi tape deck with inter-changeable head carriers for 2-track stereo, 4-track stereo and 4-track stereo with auto reverse facility – playback only.
There is no need to adjust the heads when changing to a different head carrier. The machine incorporates three electric motors and is constructed on an aluminium die-cast chassis.
Three tape speeds are available 4,76 cm per second, 9,35 cm per second and 19,05 cm per second. A switch position is available whereby the tape speed can be adjusted between approximately 3 and 22 cm per second – variable. The capstan motor is controlled electronically. The machine conforms to the DIN 45 500 hifi standard even at speed 4,76 cm per second, and can be used in a horizontal or vertical position.
The machine will accept tape spools to a maximum diameter of 27 cm – or 22 cm with the lid closed. A DIA/SLIDE head is fitted to the 2-track head carrier type 435 and the 4-track head carrier type 436. Dolby noise suppression is possible by fitting the optional modules type 438. The Dolby NR selector switch is already fitted. The machine is fitted with powerful outer rotating cage motors for forward wind and rewind making high forward and rewind speeds possible. The speed can however be adjusted between approximately 3 m and 8 m per second. Tape stress is kept to a minimum, the tape tension being controlled and adjusted by the tape tension arms. The control is opto-electronic – light emitting diodes and photo-transistors.
The capstan drive is provided by a low consumption electronically controlled DC motor – hall effect motor.
The mechanical tape functions are controlled by an electronic circuit activated by touch sensors. Light emitting diodes indicate the function selected.
Remote control accessory 439 is available for record, ⟪, ⟫, pause, start and stop.
A tachometer is fitted to the right hand tape tension arm to sense and control the fast forward and rewind speeds.
Automatic end of tape switch-off is achieved by the foils fitted to the tape. The machine will also switch off if the tape breaks. A memory counter is provided which activates the auto-stop at any desired tape position. The memory counter is switched on by the adjacent push button, the on position is indicated by a red light emitting diode. The memory counter is effective on all tape functions.
Manual recording level control with limit facility – can be switched in to limit the maximum record level after the manual level has been set.
Mixing facilities between mono or stereo microphones and phono or radio/universal input signals.
Time switch operation is possible – optional extra.
Separate illuminated moving coil level meters are supplied incorporating light emitting diodes to show which track is selected when recording. The meters ars switched between record and playback electronically.
A tape splicing block with tape clamps and cutting gap is located under a sliding cover mounted in front of the head carrier box.
Easy servicing is guaranteed by the use of plug-in electronic modules. A cueing switch for listening to the tape on fast wind is combined with a noiseless mechanical pause switch.
Record levels can be set whilst the machine is on fast wind by pressing the record sensor – the bias oscillator and record heads are switched off.
A/B monitoring in mono and stereo is possible.
A headphone amplifier is built in, controlled by a volume control fitted with switched loudness compensation.
A socket is provided for connecting the machine to an external amplifier for A/B monitoring. Long-life tape heads are fitted and the tape guides are made from non-magnetic hard anoxin steel and both will last for very long periods without showing signs of wear.
The playback signal level available at the radio socket is adjustable.
The microphone sockets can be switched to accept either low impedance/balanced or high impedance/unbalanced inputs. A microphone transformer is built in.

Recommended Tapes

Double play and long play tapes: To take advantage of the fast winding speed use rear coated tapes (eg: GRUNDIG GDR-TAPES).

Operating Controls

6 touch sensors for recording, ⟪, ⟫, pause, start, stop.
9 Rotary switches:
1. Record mode selector for automatic speech, automatic music, limiter, manual, echo, multiplay, synchroplay.
2. Input selector for microphone, radio/universal, mix.
3. Cueing combined with mechanical pause.
4. Tape speed: variable, 19.05 cm/s, 9.53 cm/s, 4.76 cm/s.
5. Track selection: Mono 1, Mono 2, stereo, duo.
6. A/B monitoring
7. "NR" (Noise-reduction): ON/OFF switch for Dolby system modules (type 438) which can be fitted subsequently.
8. Contour: ON/OFF switch for the loudness contour of the headphone volume control.
9. Mains switch combined with switch for time clock operation.

2 Buttons:
1. Button to reset tape position indicator to zero.
2. Memory counter ON/OFF.

6 Slider controls:
1. microphone level left
2. microphone level right
3. radio level stereo
4. echo multiplay level stereo
5. headphone volume left
6. headphone volume right

1 control for tape speed
1 slide switch for microphone selection high/low impedance unbalanced/ balanced

Semiconductors:

180 transistors, inc.
18 field effect transistors
5 photo transistors
196 diodes, inc.
16 light emitting diodes
1 rectifier
16 IC's

Sockets: input and output voltage, impedance, connections
2 microphone sockets switchable:

a) Standard unbalanced

micro 1 (L)			
Input voltage	=	2 x 1 – 100 mV 50 kΩ	1 + 4 2 = earth
Input voltage	=	2 x 50 mV – 8 V 2 MΩ	3 + 5 DC supply for condenser microphone
micro 2 (R)			
Input voltage	=	1 – 100 m V 50 kΩ	1 + 4 connected 2 = earth

b) Profess. use, balanced

Micro 1			
Input voltage	=	2 x 0.15 – 5 mV 200 Ω	1 and 3, 4 and 5 2 = screen
Micro 2			
Input voltage	=	0.15 – 5 mV 200 Ω	1 and 3
Radio socket			
Input voltage	=	2 x 1 – 40 mV 10 kΩ	1 + 4 2 = earth
Output voltage	=	2 x 0.5 – 1.5 V 15 kΩ	3 + 5
Universal socket			
Input voltage	=	2 x 100 mV – 5 V 1 MΩ	3 + 5 2 = earth
Output voltage	=	2 x 1 V, 1 MΩ	1 + 4
Monitor socket			
Output voltage	=	2 x 0.5 – 1.5 V 10 kΩ	3 + 5 2 = earth
Dia/Slide socket			2 = earth 5 = supply
Remote control		double socket, 16 pin	
Headphone Output power	=	2 x 50 mW, 400 Ω	
Mains		via CEE 22 plug	

Equalisation	4.76 cm/s	3180/120 µs
	9.53 cm/s	3180/ 90 µs
	19.05 cm/s	3180/ 50 µs
Frequency Response	4.76 cm/s	25 Hz – 12,5 kHz
	9.53 cm/s	25 Hz – 16 kHz
	19.05 cm/s	25 Hz – 20 kHz
Harmonic distortion	Third Harmonic ≤ 1.5 %	Third harmonic (4.76 cm/s ≤ 3 %

	Two track			Four Track		
Tape Speed	4.76 cm/s	9.53 cm/s	19.05 cm/s	4.76 cm/s	9.53 cm/s	19.05 cm/s
Signal/noise unweighted	51	59	61	49	56	58
Signal/noise ratio Weighting curve A						
without NR	57	65	66	56	63	64
with NR	65	73	74	64	71	72

Wow and flutter
4.76 cm/s ± 0.15 %
9.53 cm/s ± 0.09 %
19.05 cm/s ± 0.05 %

Speed stability (measured at 20 °C) ≤ ± 0.5 %
Mechanical noise 35 dB_A
Fast wind time 1280 m double play tape on DIN 27 spool: 190 sec.
900 m double play tape on DIN 22 spool: 145 sec.

Crosstalk (1 kHz):
a) opposite double track recording ≥ 60 dB
b) opposite stereo recording ≥ 60 dB
c) stereo crosstalk ≥ 45 dB
Automatic synchronous operation stability ≥ 2 dB
Control range (automatic) ≥ 40 dB
Rise time of record amplifier:
a) automatic speech approx. 0.5 dB sec.
b) automatic music approx. 0.1 dB/sec.
c) limiter approx. 1 dB/sec.
Crosstalk between inputs ≥ 100 dB
Nominal power output and distortion of headphone amplifier (THD ≤ 1%) ≥ 2 x 50 mW
Frequency response when the volume control is reduced by 40 dB (1 kHz = 0 dB) 60 Hz + 13 dB, 8 kHz + 4 dB

Echo — time delay
19.05 cm/s 150 ms
9.53 cm/s 300 ms
4,76 cm/s 600 ms
Mains voltage: 110 V, 130 V, 220 V, 240 V
Mains frequencies: 50 — 60 Hz
Fuses (5 x 20 mm) Si_1 = 1.6 AT, Si_2 = 0.8 AT, Si_3 = 0.8 AT, Si_4 = 0.8 AT, Si_5 = 1 AT, Si_6 = 2.5 AT.
Power consumption approx 100 W
The machine conforms to VDE 0860 H, IEC 65 and/or CCE 1.
Weight: 22.5 kg
Dimensions: B = 54,0 cm H = 50,0 cm D = 20,0 cm

The right is reserved to alter specification and operating details without prior notice.

GRUNDIG Accessories for TS 1000

Special Accessories:

(The use of these accessories is explained in the instruction book)

Head carrier type 435: 2 track stereo
Head carrier type 437: 4 track stereo auto reverse.
Both types can be used as a replacement for **head carrier type 436** (not illustrated).
Dolby NR unit type 438: optional plug in modules.
Remote control unit type 439 (fig. 1) with 8 metre cable — for remotely controlling all the touch sensor plate functions.

Standard Accessories:

Connecting cable 242 (not illustrated) — for connecting to an external amplifier fort both record and playback.
Extension cable type 391 (not illustrated) 10 metres long — for use with GRUNDIG condenser microphones.
Hifi stereo headphones for monitoring or listening via the built-in headphone amplifier.
Type 215 (fig. 2) or open headphones **type 216** (fig. 3), **type 219** (fig. 4) or improved **type 221** (fig. 5).
Sonodia 272a (fig. 6) adaptor for use with slide projectors — to synchronize the slide change to information recorded on the tape.
GRUNDIG empty metal tape spools 18 and 22 cm diameter (not illustrated).
GRUNDIG rear coated recording tape on 18 and 22 cm diameter tape spools (not illustrated)
Example: **GDR 18 Hi-Fi** (640 metres) **GDR 22 Hi-Fi** (900 metres)
Cleaning tape type 460 (not illustrated) — to clean the tape heads simply play the tape through on the slowest speed.
Tape splicing kit (not illustrated) — for splicing and editing tapes.
GRUNDIG condenser microphones:
GCM 319 for mono recording (fig. 7).
GCM 332 for stereo recording (fig. 8).
Hi-Fi television adaptor type 481 (fig. 9) — for recording television sound.
Cable 484 (not illustrated) — to record television sound via the earphone socket.

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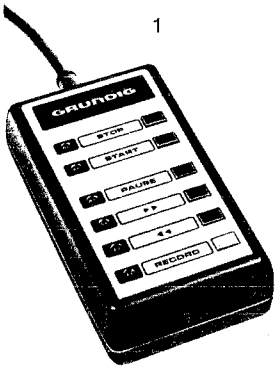

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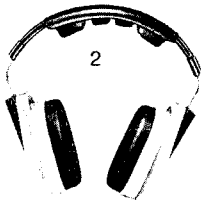

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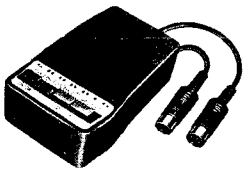

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(F) Eléments de commande

① **Régulation de la tension de bande** (à gauche et à droite)
② **Support tête** (amovible)
③ **Prises micro L:** micro stéréo ou micro mono gauche, **R:** micro mono droit. Pour microphone à prise asymétrique, avec commutateur pour micro à prise symétrique Studio.
④ **Guide de collage** (sous enjoliveur) avec repérage de la position de l'entrefer de la tête lecture.
⑤ **Indicateurs de contrôle** de modulation en enregistrement et du niveau en lecture. Les indicateurs de contrôle sont éclairés lorsque l'appareil est sous tension.
⑥ **Réglage de la vitesse:** Pour régler la vitesse de rebobinage d'environ 3 m/sec. à 8 m/sec. ou la vitesse de défilement d'environ 3 cm/sec. à env. 22 cm/sec. (sélecteur de vitesse ⑧ sur VAR-SPEED).
⑦ **Commutateur Cueing — Pause:** permet d'ecouter pendant le rebobinage et facilite donc la recherche de certains passages. En start: arrêt momentané du défilement de bande.
⑧ **Sélecteur de vitesse** pour choisir une vitesse de défilement fixe 4,75 – 9,5 et 19 cm/s ainsi qu'une vitesse variable ($\leqq$ 4,75 . . . $\geqq$ 19 cm/s).
⑨ **Sélecteur de pistes.** Positions MONO 1 et MONO 2 pour le choix des différentes pistes lors de l'enregistrement ou de la lecture en Mono. Position "Stéréo" pour le fonctionnement en stéréophonie. Position "Duo" pour la lecture simultanée de deux pistes monophoniques.
⑩ **Compteur avec touche de remise à zéro.** Facilite la recherche de certains passages de vos enregistrements.
⑪ **Compteur de pré-sélection:** pour programmer l'arrêt de la bande. Amener les molettes sur le chiffre désiré et appuyer sur la touche (la diode électro-luminescente s'allume).
⑫ **Prise casque** pour casque Hi-Fi avec fiche selon DIN 45 327.
⑬ **Commutateur secteur** pour la mise sous tension de l'appareil. Pour le fonctionnement sur une minuterie externe, appuyer sur la touche de verrouillage avec un crayon et amener le commutateur sur la position ⏲. A l'instant programmé, l'appareil commute sur ENR/START.
⑭ **Sélecteur d'enregistrement.** Positions AUT. SP et AUT. MUS. pour enregistrement musique et parole avec réglage automatique du niveau de modulation.
Pos. LIMIT. limitation de la surmodulation des enregistrements manuels grâce au réglage automatique du niveau de modulation.
Pos. MANUAL pour un réglage manuel du niveau de modulation. Positions ECHO, M. PLAY, SYN. PLAY pour enregistrements avec effets spéciaux.
⑮ **Sélecteur d'entrée.**
Pos. MICRO pour les entrées micro.
RADIO/UNIV pour entrée radio ou universelle.
MIX: pour le mélange des enregistrements de deux microphones mono, d'un microphone stéréo ou d'un tourne-disque avec des enregistrements d'un programme radio ou de toute autre source sonore.
⑯ **Réglages de niveau.**
Pour les enregistrements manuels au micro.
En mono n'actionner qu'un curseur; en stéréo le niveau d'enregistrement de chaque canal peut être réglé individuellement.
⑰ **Réglage de niveau** pour les enregistrements manuels de l'entrée radio ou universelle.
⑱ **Réglage de niveau** pour les enregistrements d'effets spéciaux MULTIPLAY et ECHO.
⑲ **Réglage du volume** pour la sortie casque.
⑳ **Commutateur de contrôle:** Position ⇈ pour contrôle sur bande en mono et stéréo. Position ⇈ pour écoute simultanée en mono et stéréo.
㉑ **Commutateur NR:** pour la mise en fonction du système Dolby NR.
㉒ **Commutateur LIN./CONT.**
Pos. LIN. La physiologie du réglage de volume ⑲ est mise hors service.
㉓–㉘ **Touches à impulsion** avec indication des fonctions grâce à des diodes électroluminescentes.
㉓ **Record:** Enregistrement. La fonction reste mémorisée lorsque la touche pause ㉖ ou la touche start ㉗ est effleurée.
㉔ ⏪ pour le rebobinage rapide.
㉕ ⏩ pour bobinage rapide.
㉖ **Pause.** Permet de brèves interruptions en enregistrement et en lecture.
㉗ **Start.** Commande le défilement de la bande en enregistrement et en lecture.
㉘ **Stop.** Pour arrêter toutes les fonctions de défilement.

A l'arrière de l'appareil
㉙ **Sélecteur de tension.** Commutable sur 110 V / 130 V / 220 V / 240 V à l'aide d'un tournevis.
㉚ **Prise de branchement secteur.**
㉛ **Plaque signalétique.**
㉜ **Prise de raccordement pour la télécommande** ⇗
㉝ **Potentiomètre de réglage du niveau de sortie.**
Régler le niveau avec un tournevis, de sorte que la reproduction à travers un amplificateur ait le même confort d'écoute qu'à travers un tourne-disques ou une radio.
㉞ **Prise Dia SLIDE:**
Raccordement d'un appareil de commande pour la projection de diapositives ou de films d'amateur.
㉟ **Prise radio** 🖀**:** Ce branchement sert en même temps à l'enregistrement et à la lecture à travers le récepteur radio.
㊱ **Prise universelle** ⌀**:** Raccordement de tourne-disques à cristal et d'un deuxième magnétophone à bande ou à cassette pour le repiquage de disques ou de bandes (entrée LINE).
㊲ **Prise monitor:** Raccordement d'un amplificateur Hi-fi avec commutateur MONITOR à l'aide du câble 242, pour le contrôle de l'enregistrement à travers le haut-parleur de l'amplificateur (sortie LINE).

Généralités

L'appareil est utilisable indifféremment en position horizontale ou verticale. Sauf indication contraire les mentions comme "en haut, en bas" concernent un appareil en position verticale.
Tenir compte des points suivants avec d'installer votre appareil.
Les surfaces des meubles sont enduites de différentes laques ou matières synthétiques contenant certains produits chimiques. Ces produits risquent d'attaquer le caoutchouc dont les pieds sont constitués, ce qui entraîne sur le meuble des depôts qui ne peuvent être enlevés que difficilement, voire pas du tout. Pour cette raison, nous vous conseillons de poser tout d'abord sur le meuble un napperon en tissu ou en feutre.
Lorsque le diamètre des bobines est inférieur à 22 cm, la platine peut rester sur l'appareil lorsqu'il est en marche. Mais pour les bobines de 27 cm, il faut l'enlever ou le rabattre.
Si l'appareil est en position horizontale, veiller à ce que la grille d'aération ne soit pas cachée. Pour une utilisation prolongée en position horizontale il est possible de dévisser les deux pieds en matière plastique. Après avoir enlevé les pieds, remettre en place les vis de fixation.
Si l'appareil est placé sur une étagère ou dans un meuble, veiller à ce que l'aération soit suffisante.
L'appareil est équipé d'un support têtes amovible. Le support têtes 4 pistes stéréo type 436 fait partie de l'équipement fondamental. Il est possible d'obtenir le support tête 2 pistes stéréo type 435 ainsi que le support tête 4 pistes stéréo avec inversion automatique en lecture type 437 comme accessoires. L'unité Dolby NR (type 438) est aussi un accessoire que votre revendeur se fera un plaisir de vous monter. Le commutateur Dolby est déjà fixé sur l'appareil.
La télécommande type 439 sert à la commande des fonctions stop, start, pause, enregistrement, avance et retour rapides.
La plaque signalétique ㉛ se trouve sur le fond de l'appareil.

Probriété littéraire et artistique
(Extrait de la Loi du 11 Mars 1957)

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